REMARKS/ARGUMENTS

Claim 33 has been amended to correct "a)" to "a1)" and to recite that the silica particles are connected by organic bridge chains comprised of carbon and hydrogen. Claim 33 has also been amended to recite the reaction of the silica particles with the diamine, dihalide, or diisocyanate groups of the connecting materials. The amendments are supported in the specification, paragraphs [0001], [0020], [0029] and [0030] of the published application. No new matter has been added.

Status of the Claims

Claims 33-64 are pending. In response to an election of species required by the examiner, Applicant elected the first group, claims 33-46, with traverse. Applicant further elected the bridge chains formed from amine or imine functional groups. With regard to the connecting material, Applicant elected the dihalide connecting material.

Claims 33, 36 - 41, 43, and 45 are under consideration. Non-elected claims 34, 35, 42, 44 and 46 - 64 stand withdrawn from consideration as being directed to non-elected species.

Statement of the Rejections

Claims 33, 36-41, 43, and 45 stand rejected under 35 U.S.C. §102 as anticipated by or, in the alternative, under §103 as unpatentable over Tomihisa et al. ("Tomihisa"). In the Abstract, Tomihisa discloses "compound fine particles" which "include inorganic fine particles and an organic polymer bound to the surfaces of the inorganic fine particles". The compound fine particles are produced by hydrolyzing and condensing an organic polymer containing at least one Si-OR1 group wherein R1 is hydrogen, an alkyl group, or an acyl group. Tomihisa discloses that the compound fine particles are produced when the organic polymer is hydrolyzed and condensed alone or with a metallic compound (G).

The examiner has taken the position that Tomihisa teaches three-dimensional network in col. 6, lines 14-17 ("[T]he inorganic oxide is defined as an oxygen-containing metallic

compound in which a metal *element* mainly constitutes a three-dimensional network *through bonding with an oxygen atom*." (emphasis added)).

The teaching refers to the known configuration of Si and O atoms, not a network among the particles themselves. There is no teaching in Tomihisa that the inorganic fine particles are in a three dimensional network with other inorganic fine particles.

The examiner also cited col. 6, line 22 of Tomihisa as teaching "the use of silica as the fine particle". Line 22 states that "fine particles including silica containing Si as the metal element constituting the inorganic oxide is most preferable as the inorganic fine particles". The use of silica per se as a starting material is not disclosed. The silica fine particles of Tomihisa are produced by the hydrolysis-condensation reactions of organic polymers having SiOR groups.

Review of Tomihisa's disclosure and examples confirms that silica is *not* used as a starting material in producing the inorganic fine particles or compound fine particles of the reference. On the contrary, the Comparative examples of Tomihisa disclose that the organic polymers do not bond with colloidal silica.

In the alternative, claims 33, 36-41, 43, and 45 stand rejected under 35 U.S.C. §103 as unpatentable over Tomihisa. The examiner again referred to the teaching in col. 6 and has taken the position that Tomihisa "teaches functional groups falling within the claimed genus and directs one to react them onto the silica as claimed". According to the examiner, "[O]ne would be motivated to select the claimed functional compounds from the list and react them as claimed".

The examiner's characterization of the teaching is not correct. It is again noted that silica is not disclosed as a starting material in the processes of producing the inorganic fine particles or the compound fine particles of Tomihisa. Therefore, even if materials having the functional groups according to Applicant's claims were selected, there is no teaching that they are reacted with silica particles. Tomihisa's silica fine particles are produced by the hydrolysis-condensation reactions of siloxane groups on an organic polymer, not by use of silica per se. As discussed hereafter, the polymer chains prevent the formation of a three dimensional network.

In the Comparative examples, Tomihisa teaches away from using silica by showing that the organic polymers do not bond with the surface of colloidal silica.

The examiner also cites *In re Marosi* and *In re Thorpe* to support his position that Applicant's claims are unpatentable because the product of Tomihisa is the same as, or an obvious variant of Applicant's claimed product "although produced by a different process". As noted previously, the three dimensional network in col. 6 refers to the configuration of atoms, not particles. There is nothing in Tomihisa that teaches that the inorganic fine particles are in a three dimensional network.

Applicant's Traversal

Applicant traverse the rejections and respectfully requests reconsideration in view of the following discussion and also requests examination of Claims 34-35, 42, 44, and 46-64 directed to the unelected species

To Anticipate a Claim, the Reference Must Teach Every Element of the Claim

The standard for anticipation is one of strict identity. To anticipate a claim for a patent, a single prior source must contain all its essential elements. MPEP §2131 states the basic requirements for anticipation under 35 U.S.C. §102 citing relevant case law. Federal Circuit court decisions repeatedly emphasize that anticipation (lack of novelty) is established only if (1) all the elements of an invention, as stated in a patent claim, (2) are identically set forth, (3) in a single prior art reference. Federal Circuit decisions reject any standard of "substantial identity".

As cited in the MPEP, "[A] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the . . . claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). ". . . exclusion of a claimed element from a prior art reference is

enough to negate anticipation by that reference". *Atlas Powder Co. v. E.I. du Pont de Nemours & Co.*, 750 F.2d 1569, 1574, 224 USPQ 409, 411 (Fed. Cir. 1984)

In *Ex parte Levy*, 17 USPQ2d 1461, 1462 (Bd. Pat. App. & Int'f 1990) the Board held that "it is incumbent upon the examiner to identify wherein each and every facet of the claimed invention is disclosed in the applied reference".

The disclosure in col. 6 of Tomihisa refers to the network of atoms, not a network of particles

The teaching of three-dimensional network in Tomihisa refers to the network of the *atoms* in the metallic compound. As stated in col. 6, lines 14-17, "[T]he inorganic oxide is defined as an oxygen-containing metallic compound in which a metal *element* mainly constitutes a three-dimensional network *through bonding with an oxygen atom*." (emphasis added). The three dimensional network is among the Si and O atoms; silica is known to have a tetrahedral structure. However, Tomihisa does not teach or suggest that the inorganic fine *particles* form a three dimensional network relative other inorganic fine particles.

The disclosure in col. 10, line 6+ relates to the preparation of the organic polymer and does not teach reaction of silica with coupling agents as a step in the formation of compound fine particles

The examiner also cited disclosure in col. 10, lines 10+ as teaching that the "three dimensional networks" referenced in col. 6 "are formed from reacting the silica with coupling agents having functional groups". The disclosure in col. 10, line 6+ relates to the preparation of the organic polymer ("[T]he organic polymer (P) can be produced by a process hitherto known to the public. . . processes (1) to (4) are cited . . . (col. 10, line 6)). The polymer P is produced from reaction of siloxane groups, not silica. The inorganic fine particles are produced by hydrolysis-condensation of siloxane or silane groups.

There is no disclosure in Tomihisa that silica particles are used as starting material and reacted with the alkoxy silane compounds to produce the compound fine particles. As discussed below, the inorganic fine particles are produced by hydrolysis-condensation reactions but are not

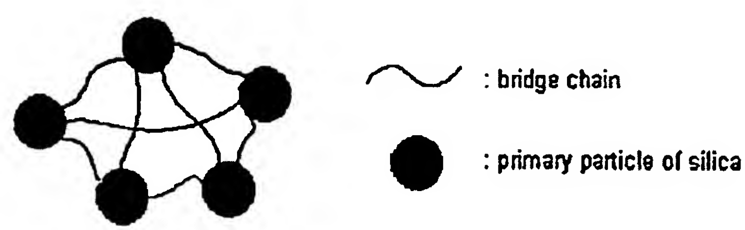
in a three dimensional network with other inorganic fine particles and are not connected by organic bridge chains as in Applicant's claimed network.

The polymer chains in Tomihisa would be expected to prevent the formation of Appliant's three dimensional network of silica particles

Silica particles are not used as a starting material for the inorganic fine particle or the compound fine particle of Tomihisa. The lists of metallic compounds do not include silica. The inorganic silica fine particles are generated by hydrolysis-condensation of the alkoxysilane groups on the polymers alone or together with a metallic compound of the formula (RO)MR1. As illustrated hereafter, the general reaction sequence of hydrolysis and condensation of the organic polymer results in inorganic fine particle aggregates in the compound fine particles.

A three dimensional network of silica particles is not formed if a polymeric material is used as the material bonded to the silica particle because of the steric effects of the size of the polymeric material. The size of the polymeric material is much larger than the size of Applicant's bridge chains which are derived from alkoxy silane coupling agents and specified difunctional connecting materials.

The silica particles in Applicant's claimed network are not aggregated (paragraph [0027], lines 17+ of the published application). In the three dimensional network of silica particles of Applicant's claims, the silica particles are interconnected by bridge materials as illustrated by Fig. 1 of the application:

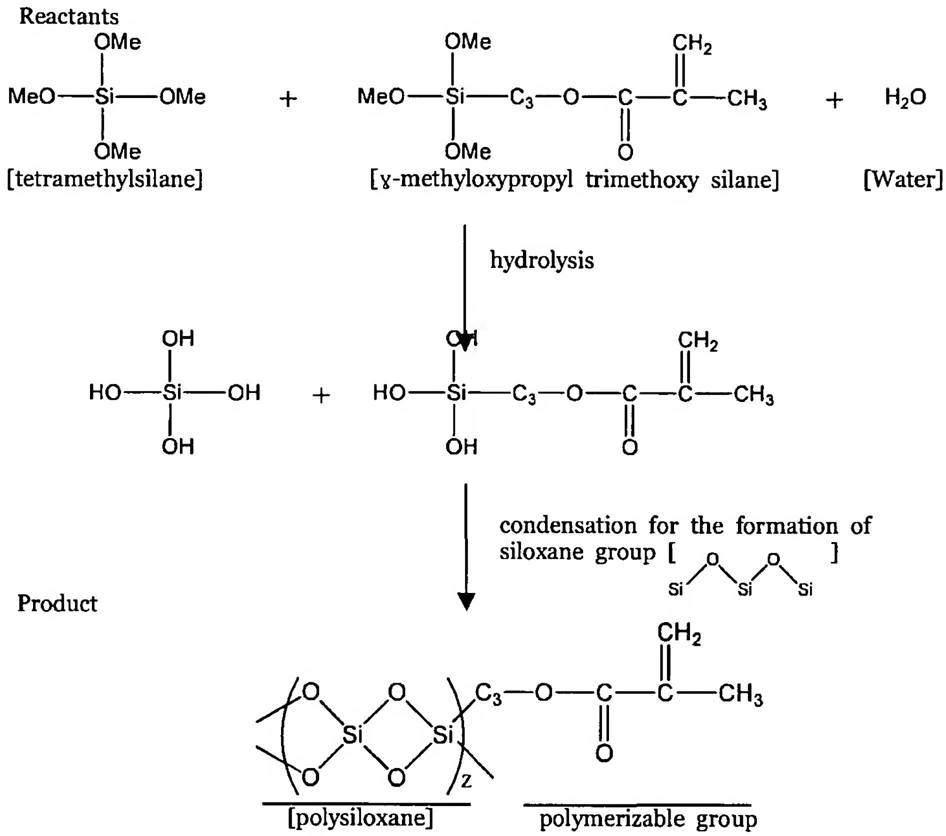


Applicant's three dimensional network provide voids and openings to entangle rubber molecules when the networked silica particles are used in rubber compositions. The polymer chains in Tomihisa would be expected to prevent formation of a three dimensional network of the inorganic fine particles because of steric effects of the long chains which mainly cover the inorganic fine particles.

Hydrolysis and condensation reactions to produce inorganic fine particles and compound fine particles

The reaction sequence on the following pages illustrates the general hydrolysis and condensation reactions in Tomihisa. The sequence follows the sequence in Tomihisa's examples beginning with the preparation of a polymerizable polysiloxane, S, and the use of this product to produce the organic polymer, P, and then hydrolysis and condensation reactions for preparation of the compound fine particles.

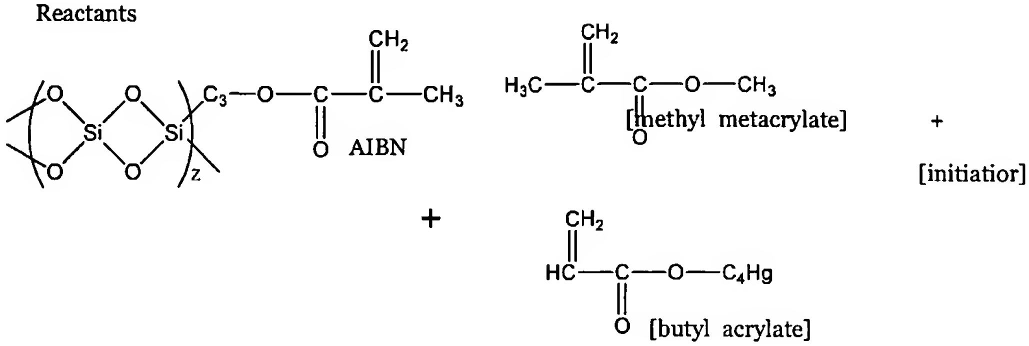
I. Preparation of polymerizable polysiloxane [S-1 ~ S-4]



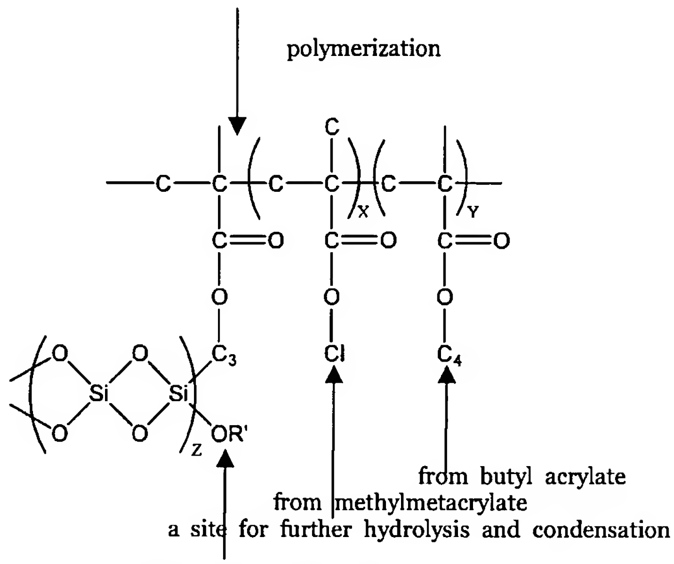
polymerizable polysiloxane

II. Preparation of organic polymer [P-1 ~ P-14]

Reactants



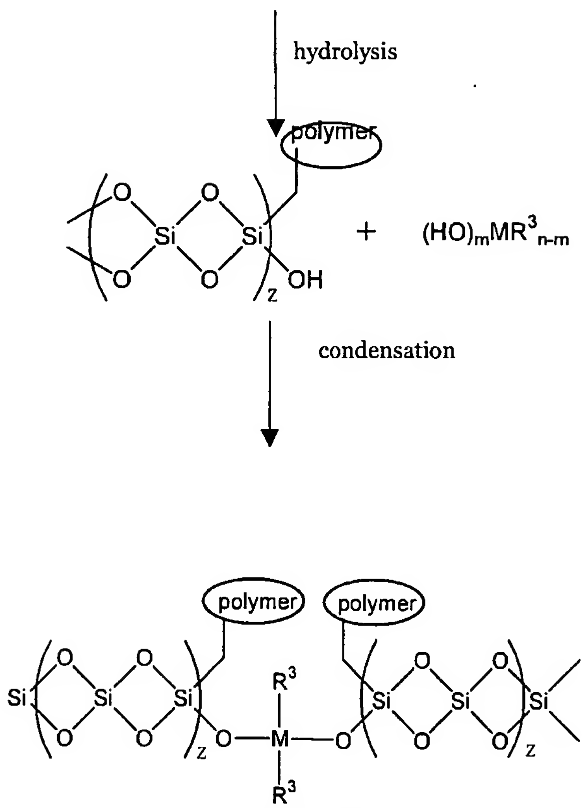
Product



organic polymer (P)

III. Preparation of compound fine particles

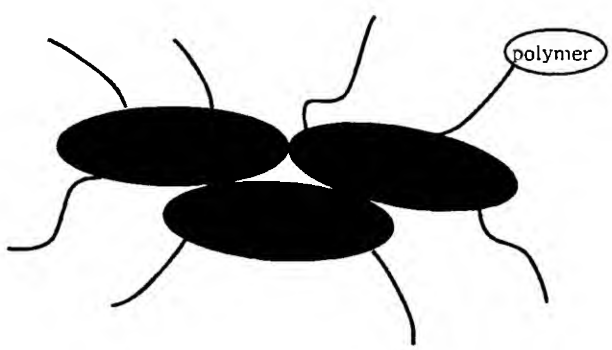
organic polymer (P) metallic compound (G) water



M is preferably Si

* at their case m=2 and n=4

The final product



aggregated silica fine particles with Si-O bonds

It is again noted that the disclosure of a "three dimensional network" in Tomihisa refers to the orientation of the metal element and oxygen *atoms* in the inorganic fine particles, not the orientation of the inorganic fine particles relative to each other. Tomihisa does not teach that the inorganic fine particles form a three dimensional network relative to each other after the organic polymer undergoes the hydrolysis and condensation reactions.

The use of the organic polymer results in silica aggregates at the center of the compound fine particles. The silica particles in Applicant's claimed network are not aggregated (paragraph [0027], lines 17+). In the three dimensional network of silica particles of Applicant's claims, the silica particles are interconnected by bridging materials as illustrated by Fig. 1 of the present application. The three dimensional network results from the use of silica particles as the starting material which are then reacted with organic bridging materials comprised of carbon and hydrogen. The network formed among the silica particles prevent their aggregation (paragraph [0020]).

The inorganic fine particles of Tomihisa are bonded by silicon-oxygen bonds which do not contain either carbon or hydrogen.

The bridge chains are comprised of carbon and hydrogen. As shown in the above reaction sequence, the aggregated inorganic fine particles of Tomihisa are bonded by silicon-oxygen bonds which do not contain either carbon or hydrogen. Since the compound fine particles are different from Applicant's claimed networked particles, Applicant's claims are not anticipated by Tomihisa.

The three dimensional networks of silica particles according to Applicant's claims are not obvious over Tomihisa

When applying 35 U.S.C. 103, the following tenets of patent law must be adhered to:

(A) The claimed invention must be considered as a whole;

(B) The references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination;

(C) The references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention; and

(D) Reasonable expectation of success is the standard with which obviousness is determined.

Hodosh v. Block Drug Co., Inc., 229 USPQ 182, 187 n.5 (Fed. Cir. 1986).

In *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1537, 218 USPQ 871, 877 (Fed. Cir. 1983), the Court noted that "the question under 35 U.S.C. § 103 is not whether the differences [between the claimed invention and the prior art] would have been obvious" but "whether the claimed invention *as a whole* would have been obvious." (emphasis in original).

MPEP §2143 states the basic requirements of a *prima facie* case of obviousness citing supporting case law:

1 There must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one skilled in the art to modify the references or combine reference teachings. (see MPEP §2143.01)

2. There must be a reasonable expectation of success. (see MPEP §2143.02)

3. The prior art reference (or references when combined) must teach or suggest all of the claim limitations. (see MPEP §2143.03)

The fact that references can be modified or combined is *not* sufficient to establish *prima facie* obviousness. (MPEP §2143.01). The fact that the claimed invention may be within the capabilities of one of ordinary skill in the art is *not* sufficient by itself to establish *prima facie* obviousness.

Differences Between the Prior Art and the Claimed Invention

The factual inquiries for establishing a background for determining obviousness under 35 U.S.C. 103(a) are set forth in set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966) and include determining the scope and contents of the prior art and ascertaining the differences between the prior art and the claims.

Tomihisa discloses "compound fine particles" which "include inorganic fine particles and an organic polymer bound to the surfaces of the inorganic fine particles". The compound fine particles which are produced by hydrolyzing and condensing an organic polymer containing at least one Si-OR1 group wherein R1 is hydrogen, an alkyl group, or an acyl group. Tomihisa discloses that the compound fine particles are produced when the organic polymer is hydrolyzed and condensed alone or with a metallic compound (G).

Silica particles or functionalized silica particles (silica particles reacted with alkoxy silane coupling agents) are *not* disclosed among possible metallic compounds for use in producing the inorganic or compound fine particles.

Tomihisa discloses that the metal element and oxygen *atoms* in the inorganic oxides are in a "three dimensional network". This is not a teaching that the inorganic oxides or inorganic fine particles are in a three dimensional network with other oxides or particles.

Applicant's three dimensional network of silica particles are produced by reactions in which silica particles or functionalized silica particles as the starting material. The groups on the functionalized silica particles are reacted with groups on other functionalized silica particles (reaction 1). In reaction 2, silica particles are reacted with organic connecting material and in reaction 3 functionalized silica particles are reacted with organic connecting material. In all three reactions, silica particles or functionalized silica particles are the used as the starting material.

As discussed hereafter, the steric effect of the chains of polymer material in Tomihisa would prevent the formation of three dimensional networks of silica particles. The inorganic fine particles are connected by Si-O bonds which do not contain carbon or hydrogen atoms.

Tomihisa does not teach reaction of silica as a starting material in the formation of compound fine particles

The examiner also cited disclosure in col. 10, lines 10+ as teaching that the "three dimensional networks" referenced in col. 6 "are formed from reacting the silica with coupling agents having functional groups". The disclosure in col. 10, line 6+ relates to the preparation of the organic polymer ("[T]he organic polymer (P) can be produced by a process hitherto known to

the public. . . processes (1) to (4) are cited . . . (col. 10, line 6)). The polymer P can be produced by reaction of a polymer with reactants which include alkoxy silane. There is no disclosure that silica is reacted with the alkoxy silane compounds to produce the compound fine particles.

It is noted that colloidal silica is used in the Tomihisa's Comparative examples in cols. 39-42. The products of the Comparative examples are different from Applicant's claimed network of particles because Tomihisa discloses that the polymer does not bond with the colloidal silica . Applicant's networks do not include polymers and the silica particles are connected by covalent bonds to bridging groups. As discussed above, one skilled in the art would not be motivated to use silica in view of the lack of bonding disclosed by the Comparative examples of Tomihisa.

Tomihisa teaches away from the use of silica particles as starting materials; teaching away is evidence of non-obviousness of Applicant's claimed invention

It would not be obvious to use silica particles in the process of Tomihisa because the reference specifically teaches away from the use of silica particles as starting materials. In Comparative examples 1-6, colloidal silica is treated with organic polymers. In these examples, Tomishasi teaches that the organic polymer does *not* bond with the surface of the colloidal silica. Tomihisa requires that the polymer is bonded to the inorganic fine particles and the Comparative examples show that the polymers do not bond to the silica particles when used in the process of Tomihisa. Therefore, one skilled in the art would not use silica particles in the processes of Tomihisa.

The silica particles of the claimed invention form the three dimensional network by being connected to each other by covalent bonding of a silica particle to each end of the connecting materials (reactions 2 and 3) or the as a result of reaction of the functional groups per reaction 1. The connecting materials are diamine, dihalide, or diisocyanate.

Polymers such as those disclosed in Tomihisa would not produce the three dimensional networked silica particles of Applicant's claims. The reference teaches that the polymers do not bond with colloidal silica particles. It is again noted that the disclosure of a "three dimensional

network" in col. 6 of Tomihisa refers to the orientation of the metal element and oxygen *atoms*, not the orientation of the inorganic fine particles relative to each other. Tomihisa does not teach that the inorganic fine particles form a three dimensional network with each other after the organic polymer undergoes the hydrolysis and condensation reactions. As discussed previously, the polymer chains surround the inorganic fine particles preventing the formation of any three dimensional networks.

Tomihisa does not provide a sufficient basis for a reasonable expectation of success

Reasonable expectation of success is the standard with which obviousness is determined. Applicant submits that there is no reasonable expectation of success in obtaining Applicant's claimed three dimensional network from any modification of the process of Tomihisa. The reference requires an organic polymer having SiOR groups as the starting material. The use of silica per se is not disclosed. For the reason discussed previously, the polymer chains in Tomihisa would be expected to prevent the formation of Appliant's hree dimensional network of silica particles.

There is no reasonable expectation of success in using silica as a starting material in the process of Tomihisa because the reference teaches away from the use of silica particles as starting materials in the Comparative examples. The reference specifically teaches that the polymer does not bond with the colloidal silica and that the resulting products are unsuitable for their intended use. Applicant's submit that such is evidence of no reasonable expectation of success and that teaching away is evidence of non-obviousness of Applicant's claimed invention.

Applicant's claimed three dimensional network is not the same as or an obvious variant of either the inorganic fine particles or the compound fine particles of Tomihisa

The examiner also cited *In re Marosi* and *In re Thorpe* to support his position that Applicant's claims are unpatentable because the product of Tomihisa is the same as, or an obvious variant of Applicant's claimed product "although produced by a different process". As noted previously, the three dimensional network in col. 6 refers to the configuration of atoms,

not particles. There is nothing in Tomihisa that teaches that the inorganic fine particles are in a three dimensional network or connected by bridge chains containing carbon and hydrogen.

The dependent claims are dependent on Claim 33 and are patentable over Tomihisa for the reasons discussed above. The bridge chains formed from the alkoxy silane coupling agents and the connecting agents of the dependent claims are organic chains containing carbon and hydrogen atoms. As discussed previously, the aggregated silica fine particles in Tomihisa are connected by Si-O bonds.

Applicants submit that a review of the prior art of record as a whole shows that the claims in the present application meet the requirements for patentability. Applicant respectfully requests examination of Claims 34-35, 42, 44, and 46-64 directed to the unelected species and allowance of claims 33 to 64.

Respectfully submitted,

SEO ET AL

BY_______________

Maria Parrish Tungol
Registration No. 31,720
Telephone: (571) 969-5585